RADIO REMOTE CONTROL

M550L

User's Manual

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INTRODUCTION

This manual contains detailed instructions for the installation, use and maintenance of the M550 radio remote control family. In order to obtain the best possible performance during its operation, in complete safety, all operators must read the instructions provided in this manual carefully and follow them scrupulously.

All operations regarding the installation, use and maintenance must be performed by specialised personnel only.

The enclosed sheets A, B and C have to be considered an integral part of this manual.

1 Identification data

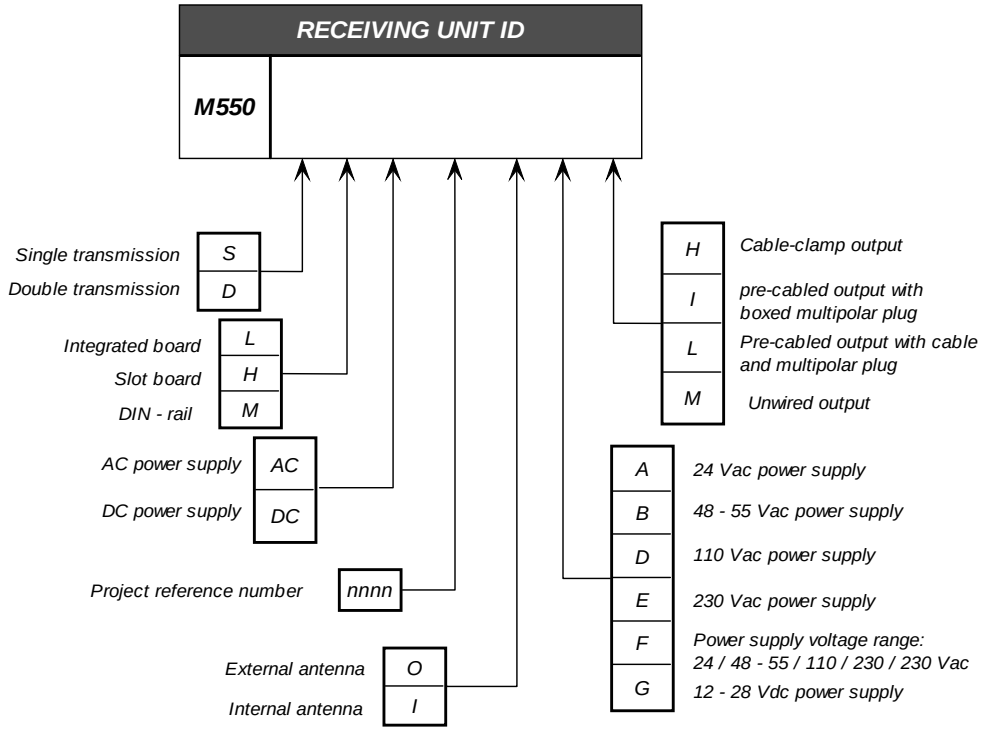
Industrial radio remote control			
Date of installation	*Year of construction*	CE	*Serial no.*

TRANSMITTING UNIT ID	
M550	

Single transmission	*S*
Double transmission	*D*

Receiver combined with pushbutton (12 buttons + Start and Stop)	*WAVE L12*
Receiver combined with pushbutton (10 buttons + Start and Stop)	*WAVE L10*
Receiver combined with pushbutton (8 buttons + Start and Stop)	*WAVE S8*
Receiver combined with pushbutton (6 buttons + Start and Stop)	*WAVE S6*
Receiver combined with pushbutton (4 buttons + Start and Stop)	*WAVE S4*
Transmitter with 4 bi-axial joysticks	*G4*
Transmitter with 3 bi-axial joysticks	*G3*
Transmitter with 2 bi-axial joysticks	*G2*
Transmitter with selectors and potentiometer	*S2*
Transmitter with selectors	*S1*
Transmitter with 6 single-axial joysticks	*Z6*
Transmitter with 2 single-axial joysticks	*Z2*

nnnn	*Project reference number*



1.1 Types of radio remote controls specified in this manual

The **M550** family is made up of many different radio control versions. Some are characterised by the use of digital controls (on/off), whereas others enable two control typologies to be used simultaneously, both analogue and digital together. This manual deals with the receiver versions L-AC and L-DC. The easy identification code, given in the table above, means the configuration of the product and can be easily recognised.

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2. CONVENTIONS USED IN THIS MANUAL

Attention
This symbol means: instructions to be complied with for a correct working of the radio remote control.

Danger
The paragraph marked with this symbol contains information to be complied with carefully to avoid dangerous situations.

Note
This arrow means: remarks containing suggestions for a radio remote control use.

3. OPERATION DESCRIPTION

The **M550 system** is the result of **IMET** long experience in the field of radio remote controls.

The high technology applied has enabled to manufacture a product enhancing the main properties of a modern radio remote control.

Thanks to its compact anti-collision plastic container, the **M550 system** can stand the heaviest use conditions with the highest reliability.

Equipped with a removable and rechargeable battery, available in the version with exclusive waterproof locking-in system, for the transmitting units type S, G and Z, and in the hermetic version with gold plated contacts for models type WAVE, **IMET** radio remote control assures operation for continuous working shifts in the most climatic and environmental conditions.

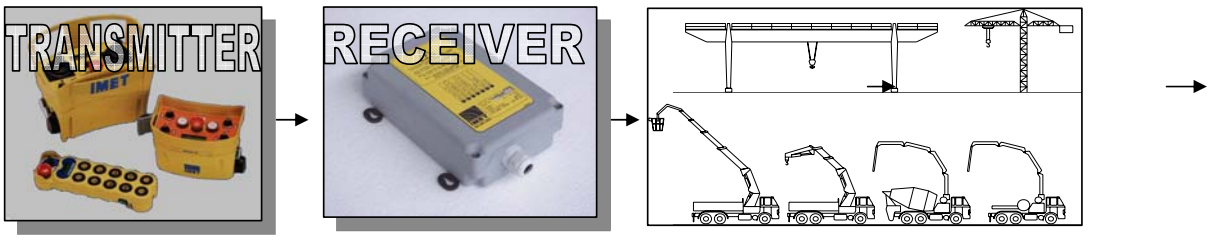
A practical, clear and ergonomic control panel allows complete control of all the machine's functions, letting the operator perform even the most difficult manoeuvres safely and freely.

The **M550** system is equipped with a frequency synthesis radio (PLL) allowing to change the transmission channel frequency directly from the control switchboard.

A double decoding channel allows to obtain very high safety levels thus reducing error probability in practice to zero.

Thank to the **safety STOP** function the system is able to operate in compliance to the most strict existing safety norms. The homonymous relays, opportunely connected, grants, when releasing a command, the safety function in case of failures (UNI-EN 954-1 norm). The safety category of each command is stated in the enclosure B and depends also from the **safety STOP** function, which allows to decrease of one level the safety category of the command. This system can grant a high safety level in dangerous situations, where a higher safety category is required.

The wide range of versions available can meet all user's requirements. Easy to install, the radio remote control IMET M550 can be integral part of each machine, requiring a wireless command system. It can be supplied with a cable clamp or a multiple connector fixed on the receiver case or with precabled outputs through a multiple plug. The system can operate using both during current (12÷28 Vdc) or alternate current (24, 48, 55, 110 e 230 Vac).



4. COMMON APPLICATIONS

The most common applications of the radio remote control generally regard hoisting and hauling machines as construction cranes, bridge cranes, truck mounted cranes and concrete pumps. Other applications are not to be excluded, as long as they are in compliance to the conditions mentioned on the chapter below.

4.1 Non-admitted uses

The radio remote control may not be used if the climatic and electric characteristics mentioned in the chapter 7.O are not present. Moreover, the radio remote control application is forbidden in places requiring antideflagration characteristics.

5. INSTRUCTIONS FOR USE

Deleted: *CORRETTO E SICURO*

For the correct radio remote control use it is necessary to comply with the rules described below, which are essential for work safety.

5.1 Safety rules to be complied with

The radio remote control use is allowed to competent operators, who should have a perfect knowledge of the radio remote control operation and of the relative machine. IMET strictly recommends to arrange a proper training for all operators using the radio remote control.

It is forbidden to switch on the transmitter in places where the machine, commanded through the radio remote control, is not completely visible. By switching on the transmitter in a closed place or, in any case, far from the receiver, it is evident that it is not possible to be really aware of the operations to be carried out. This can bring to dangerous situations.

In case of work suspension, even for short periods, the control unit has to be switched off and the key removed from the transmitter, thus to avoid its use by non allowed personnel.

5.2 Start function

- Make sure that the transmitter is switched off and the key selector is in anticlockwise position (type S, G and Z), or that the key with reed contact has been removed from its seat (type WAVE).
- Insert a loaded battery in the transmitter.
- Make sure that the mushroom-head button for emergency is not switched on.
- Feed the machine and the receiver (remember that it takes approx. 3 seconds to the receiver to be ready for the operation, as it carries out some safety check tests before).
- Switch on the transmitter by turning the key in the clockwise direction (type G, S, and Z), or inserting the key with reed contact in the its seat (type WAVE).

Press the START button ⏻; The green light on the transmitter will be continuously lit when operation is correct. From now on, it is possible to carry out the desired commands. The transmitter may not be started when the battery is not sufficiently charged, the emergency push button is pressed or any key is pressed during the start phase.

5.3 Emergency function

Press the red mushroom-head button; this action will stop immediately the machine and all commands. To restart operation, restore the emergency stop button operation.

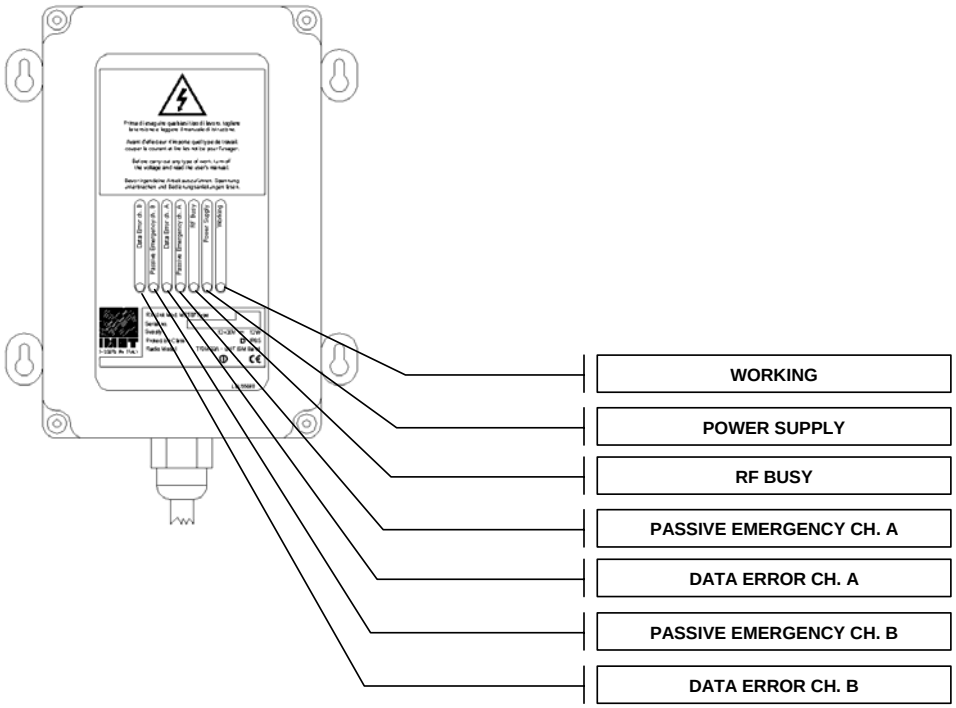
5.4 Switching off

Press thoroughly the emergency stop button. The transmitter is switched off and the receiver stops.

5.5 Self switching off

- The transmitter is switched off after approx. 3 seconds of no operation.
- The transmitter is switched off when the battery is down.

5.6 Luminous indicators



Receiving unit	
Led	*Indication*
Data error ch. B ***(Yellow Led)***	*Normally switched on when operating.* *It is off in case of data errors on channel B.* *The system errors are showed by some decoded blinks..*
Passive emergency ch. B ***(Red Led)***	*Normally off when operating.* *It is on when the channel B of the system is in stop condition.*
Data error ch. A ***(Yellow Led)***	*Normally on when operating.* *It is off in case of errors on channel A.* *The system errors are showed by some decoded blinks..*
Passive emergency ch. A ***(Red Led)***	*Normally off when operating.* *It is on when the channel A is in stop condition.*
RF busy ***(Green Led)***	*When on it shows the presence of a signal on the radio channel.*
Power Supply ***(Green Led)***	*When on it means that the system is under supply.*
Working ***(Green Led)***	*When on it means that the 2 safety relays are closed. Now it possible to operate.*

Transmitting Unit	
Led	*Indication*
Green Led	*When on it shows that the system is working.* *When blinking at regular intervals means that the battery is down.* *During the set up procedure of the analogue scales it gives some decoded blinks.* *In case of an anomaly in the emergency stop circuit it starts blinking in according to a specific modality (see chapter 10)* *In case of a system error it gives some decoded blinks*

5.7 Battery state indicator

The battery state indicator is showed by a luminous indicator placed on the transmitter, normally lit during operation. When the battery enters the reserve phase, it starts blinking. When the battery is completely down, the transmitter is switched off according to the procedure described by chapter 5.4. The reserve phase lasts approx. 15 minutes.

During the reserve phase, place immediately the machine in safety position before replacing the battery.

5.8 Battery replacement and charging

Switch off the transmitter and remove the battery, introduce it into the battery charger and wait for the charging completion (2 - 3 hours).

The battery charger blinks 4 times (pre-charging) when introducing the battery, then the charging phase starts. To confirm this, the LED is continuously lit. When recharging a battery which is completely down, it is possible that the blinking phase (pre-charging) lasts much longer. Anyway, it is followed by the real charging phase.

To assure a better efficiency and a longer life of a battery, we suggest to make use completely of a charge, which is signalled on the transmitter by the blinking led.

Caution: do not break off the charging by removing the battery from its housing or switching off the battery charger when the signalling LED is still on.

Abstain, as far as possible, from recharging a battery completely or partially charged.

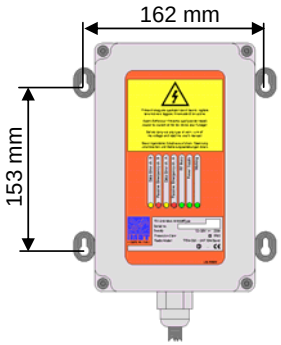
The battery charger has been conceived for use in buildings, therefore it should be protected against atmospheric agents. The battery recharging should be carried out in rooms without humidity and at a temperature ranging from 0 to +35° C.

6. CRITERIA FOR A PERFECT INSTALLATION

The radio remote control installation does not imply any particular difficulty. Anyway, for a good system operation, it is important to comply carefully with the rules described below.

- The installation should be carried out exclusively by qualified personnel.
- Do not elude the existing machine safety systems and comply with any manufacturer's instruction.
- Install the receiver in vertical position, in an accessible place without metal obstacles which might attenuate the radio waves reception. Moreover, abstain from installing the receiver too far from the floor (1O-2O metres). At this height, it is possible to receive radio signals which might jam the reception of the radio signals coming from the transmitter.
- In presence of strong mechanical vibrations, put some rubber shock-absorbers between the machine and the receiver.

6.1 Drilling plan for receiver fastening



6.2 Connection

No operation has to be carried out with the appliances under tension

The radio remote control power supply must be connected down from the machine main switch. A direct connection is strictly forbidden. The switch of the distribution net must be equipped with a system against a non-authorised closure (padlock).

There are several possibilities of connection for the radio remote control:

- ✓ pre-cabled, with multiple connector fixed on the receiver box.
- ✓ With cable output, pre-cabled on the internal connectors and with mobile multiple plug.
- ✓ To be cabled on the internal connector and equipped with a cable clamp.

The wiring between the receiving unit and the machine must never be of a “fixed” nature. At least a part must be connected to a multiple connector which enables the control to be reset, at any time, via cable.

The configuration of the radio control can be identified by referring to chapter 1 of this manual.

The wiring of the receiving unit to the machine must be carried out in accordance with the Regulation EN60204. The connecting wires must have a minimum cross-section of 0.75 mm^2 and be of a self-extinguishing type.

Refer to the transmitting unit controls diagram (see enclosure A) and the receiving unit wiring diagram (see par. 6.4 and 6.6 and enclosure C) in order to determine the equivalence between the actuators of the two units.

The wiring diagrams of paragraph 6.4 and 6.6 represent all available commands, which can be reduced in accordance to the radio remote control configuration.

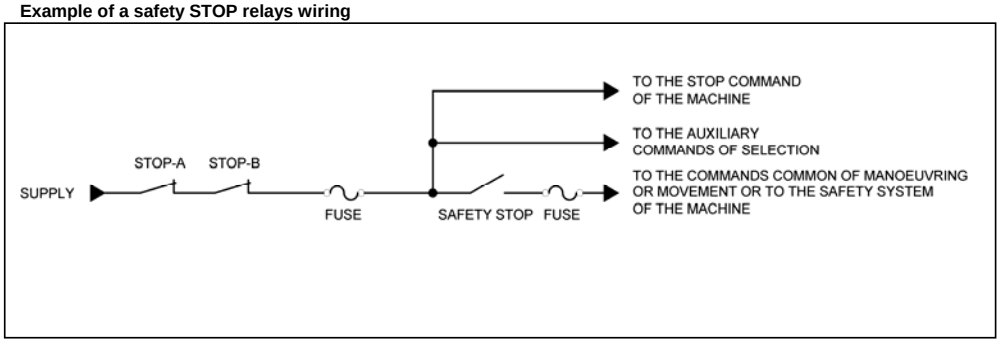
The receiver can be supplied at 24, 48, 55 110 and 230V. If requested, it can be supplied for use with continuous current at 12 ÷ 28V. Therefore particular attention must be paid to the connection of the line voltage to the receiving unit terminal block. As far as the version of receiver in alternate current is concerned, in order to grant effective protection, it is also essential to adjust the current value of the fuse F13 according to the line voltage(see paragraph 6.3):

- Fuse of 0.63A delayed for tensions from 110 Vac to 230 Vac
- Fuse of 1.25A delayed for tensions from 24Vac to 48÷ 55 Vac

If at all possible, use the tips provided for terminating the conductors in such a way that the work is carried out as expertly as possible, taking care to check the terminal screws are tightened.

Each command is provided with an additional safety function (**safety STOP**), activating the correspondent relays in the receiver, thus granting the safety function when releasing a command. In case of operating failures. The **safety STOP** function increase on a value the safety category of the related command (see enclosure B). For its activation, connect the relays of this command directly to the machine (if available), or in series. The risk evaluation has been based on the UNI EN 954-1 norm.

Example of a safety STOP relays wiring

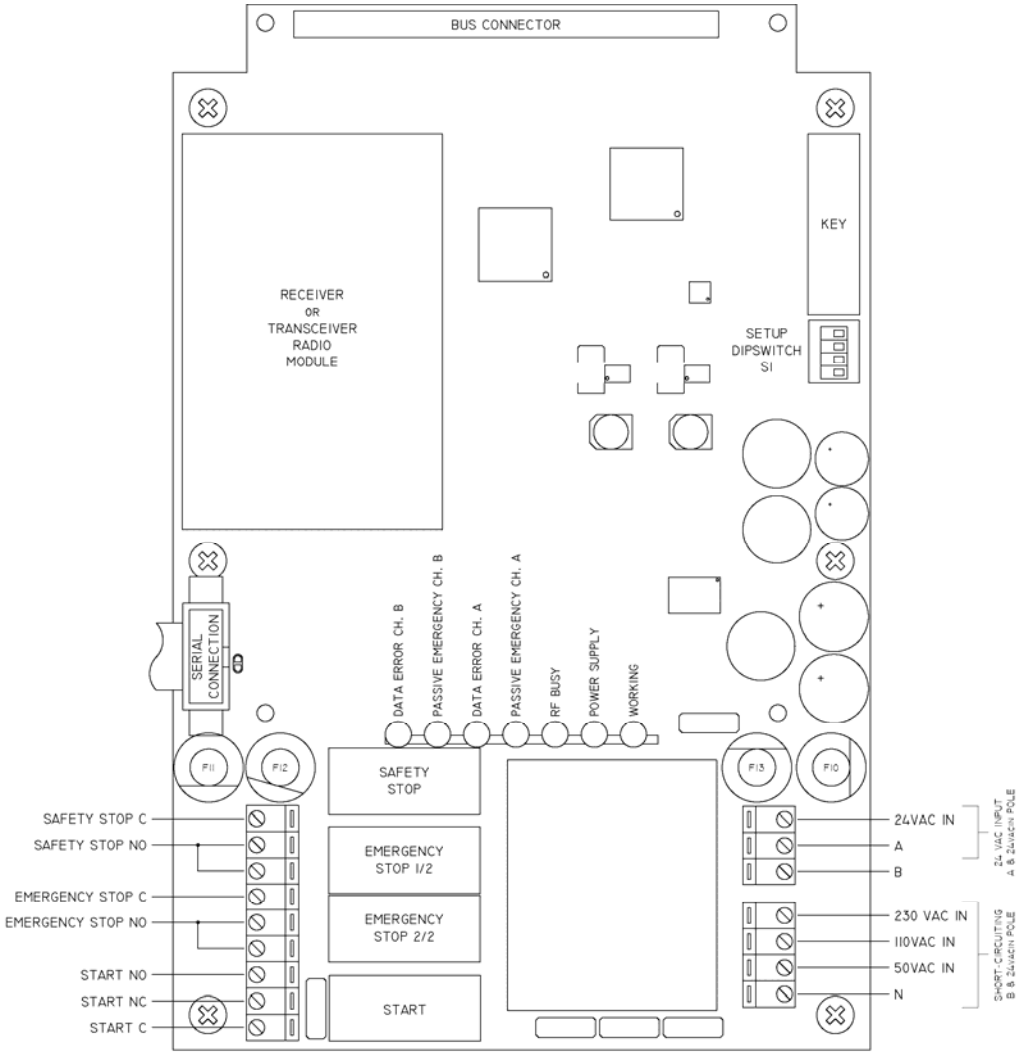


Connect the emergency circuit so to command the coil of the main remote control switch of the machine, considering that the most available current tension is 5A. **The safety category of the emergency circuit is 4 (UNI EN 954-1 norm).**

Once the installation is complete, carry out an inspection and check that all the functions, both of the radio control and the machine, are working properly. It is also compulsory to control the correct intervention of the stop circuit. Press the stop button during operation: the main relay switch should deactivate and disable all the controls.

Finally, fill out the card with the wiring diagram of the connection of the receiving unit to the machine and write the date of installation in the box provided on the first page of this manual.

6.3 AC receiver main board

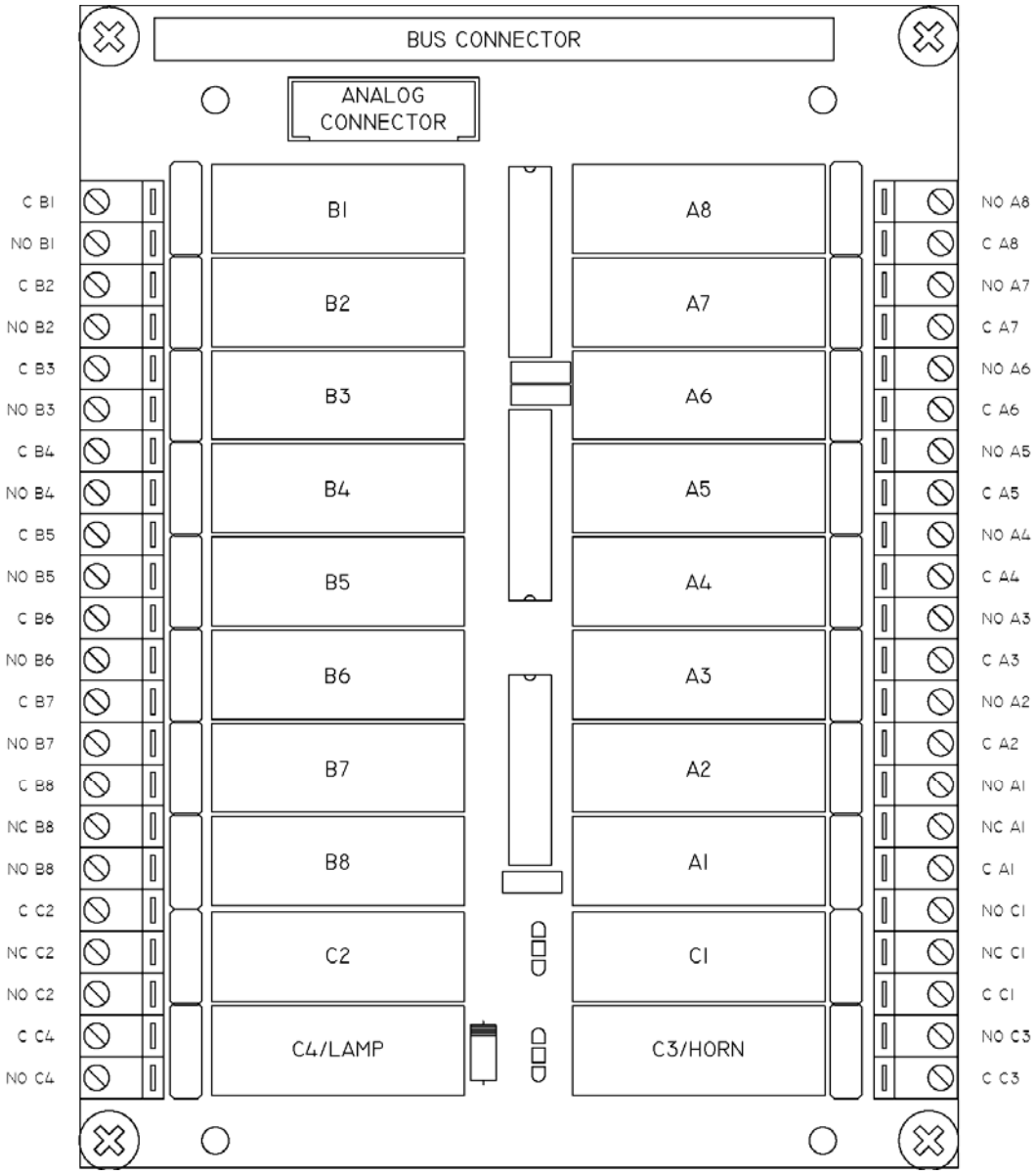


FUSES SPECIFICATIONS:

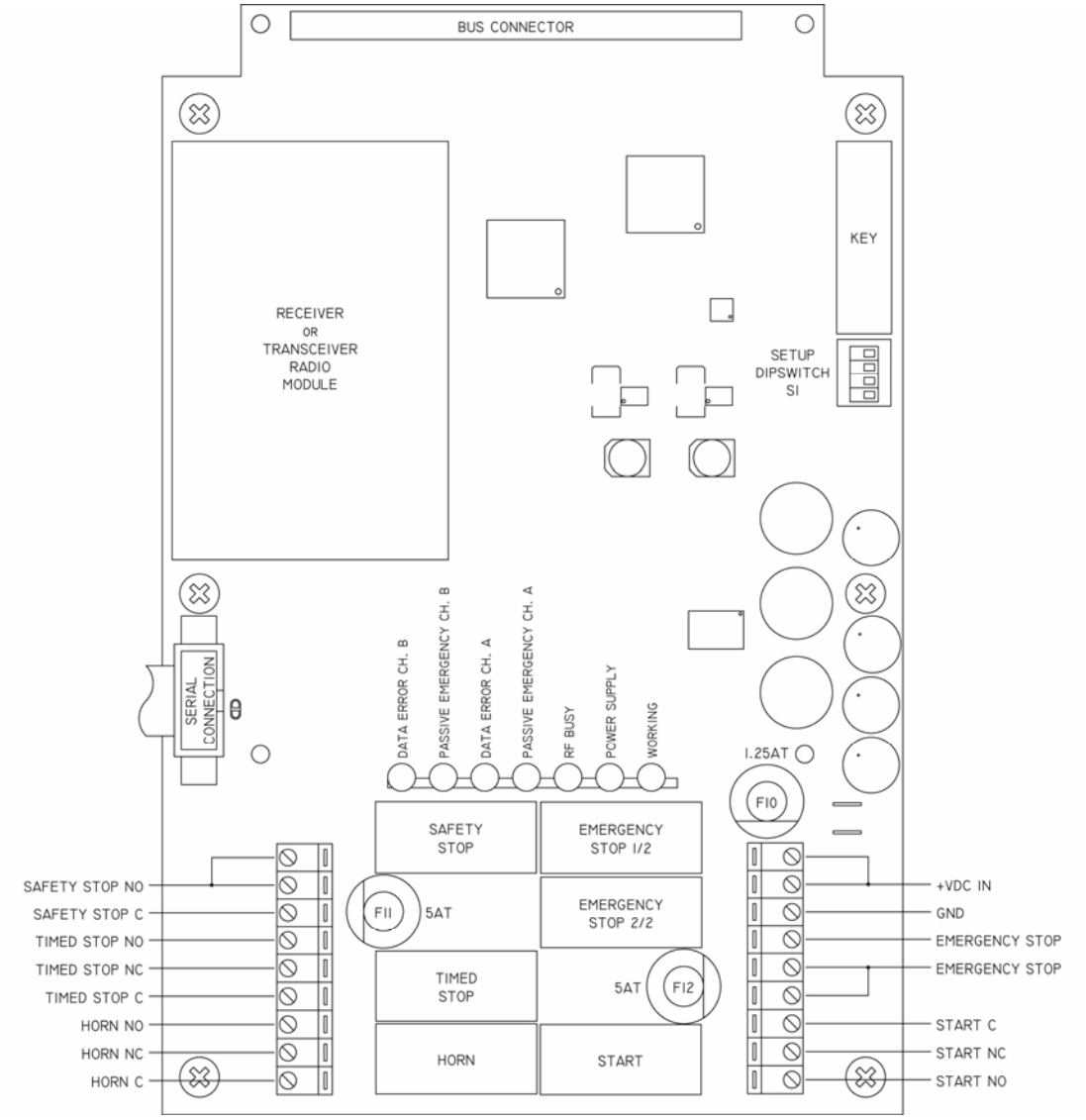
F11 - EMERGENCY STOP FUSE - 5AT
F12 - SAFETY STOP FUSE - 5AT
F13 - PRIMARY POWER SUPPLY FUSE - 1.25AT AT 48-55VAC - 0.63AT AT 110-230VAC
F10 - SECONDARY POWER SUPPLY FUSE - 1.25AT

POWER SUPPLY
1) FOR 24VAC CONNECT BETWEEN 24VAC IN AND POLE A
2) FOR 48-55-110-230VAC SHORTCIRCUIT 24VAC IN AND POLE B
3) FOR 48VAC E 55VAC CONNECT BETWEEN 50VAC IN AND POLE N

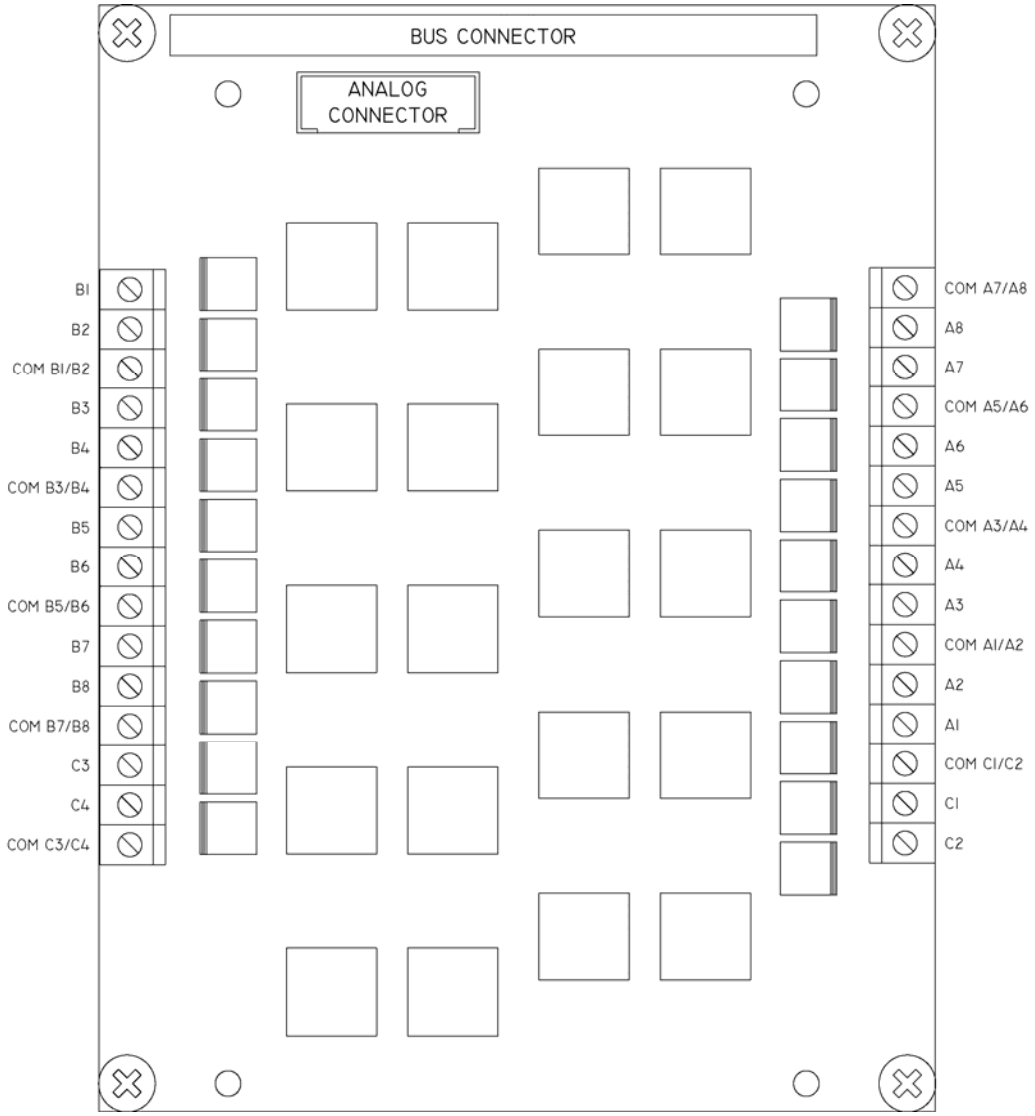
6.4 *AC receiver ON/OFF outputs*



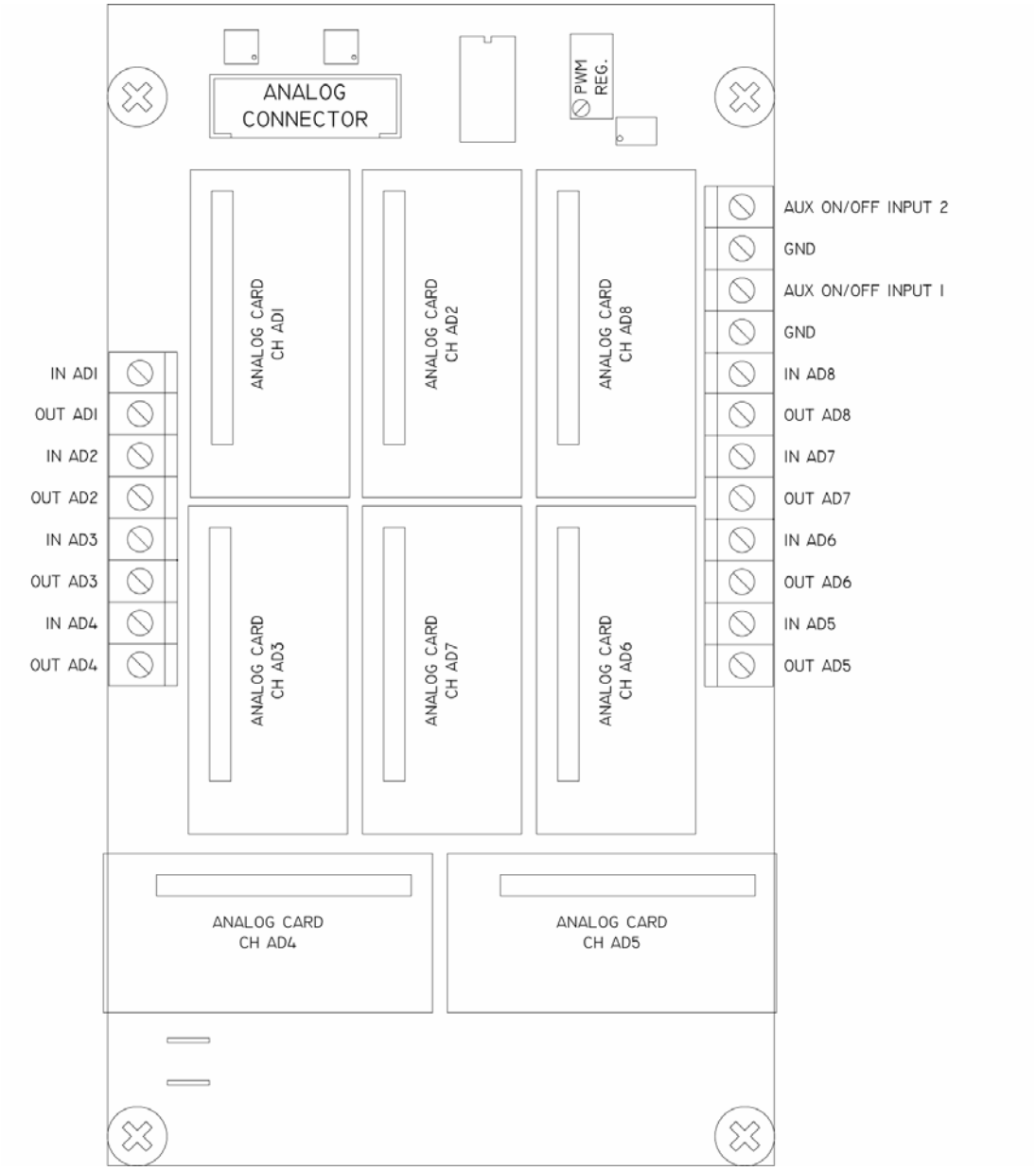
6.5 DC receiver main board



6.6 DC receiver ON/OFF outputs



6.7 DC receiver analogue outputs



6.8 Set up of logic functions

The receiver can be set up by selecting the position of the Dip-Switches placed inside the receiver (see par. 6.3 and 6.5)

Table 0: The commands coming from the transmitter are executed without being subjected to any conditioning by the receiver.

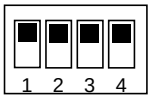
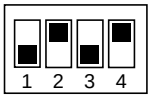
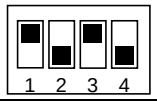
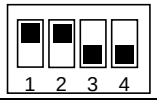
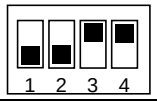
Table 1: Three speeds associated with three different keys with command maintenance. Once the basic speed key is pressed down(A1 and/or A2), the second speed (A3), or the third speed key (A4), needs only to be pressed briefly and said functions will be maintained till the basic speed is released.

Table 2: Three speeds associated with three different keys with command maintenance. The description given for table 1 applies, with the only difference being, in this case, that the basic speed keys are A5 and A6, whilst the second and the third speed keys are A7 and A8.

Table 3: Is the combination of the two previous tables.

Table 4: Three speeds associated with just 2 keys with memory. In this case, the dual function of the key is exploited allowing the basic speed to be obtained when pressed once and the second speed when pressed for the second time. The third speed is, instead, activated by another key, specifically: A3 for the A1/B5 or A2/B5 key, and A4 for A5/B7 or A6/B7.

Table 5: In case the radio remote control is to applied to a bridge crane, since this function requires distinct second speed controls, even the second function of each key (which normally belongs to two adjacent keys ant is the same for both) is used as a distinct impulse.

Table 0	ON OFF 	*No automatic maintenance*
Table 1	ON OFF 	*A3 or (A3 and A4) , maintained by A1or A2.*
Table 2	ON OFF 	*A7 or (A7 and A8) maintained by A5 or A6.*
Table 3	ON OFF	*Table 1 + Table 2*
Table 4	ON OFF 	*A3 maintained by (A1+B5) or (A2+B5)* *A4 maintained by (A5+B7) or (A6+B7)*
Table 5	ON OFF 	*Second speed – Distinct*

7. TECHNICAL SPECIFICATIONS

• Manufacturer	**IMET S.r.l.**
• Working frequency	**I.S.M. Band 433.075 ÷ 434.775 Mhz**
• Standard	**ETSI EN 300 220-3**
• Channel spacing	**25 Khz Simplex, (25 KHz Half Duplex)***
• Number of P.L.L. programmable radio channels	**30**
• Outreach	**≅ 100 m**
• Modulation	**GMSK Dev. 3 KHz**
• Receiver sensibility	**0.22 uV 12 dB Sinad**
• Hamming distance	**≥ 9**
• Error non-detection probability	**< $7.34x10^{-12}$**
• Available pairing addresses	**65536**
• Delay time on receiver start	**< 3 sec**
• Delay time on the start command	**< 750 ms**
• Response time of commands	**< 110 ms, (< 120 ms)***
• Response time of active emergency	**< 150 ms, (< 220 ms)***
• Response time of passive emergency	**< 800 ms**
• Safety category of STOP command (UNI EN 954-1)	**4(UNI EN 954-1)**
• Safety category of movement commands (UNI EN 954-1)	**3 (UNI EN 954-1) (with safety STOP)**
• Operation and storage temperature	**-20°C ÷ +70°C(-4°F ÷ +158 °F)**
• Housing protection degree	**IP 65**
• Housing material	**Charged Nylon**
• Quantity of safety commands	**2 Safety Stop, Emergency stop**

Transmitters type WAVE:

• Max. quantity of ON/OFF commands	**16 (WAVE S), 20 (WAVE L)**
• Service commands	**1 Klaxon**
• Max. quantity of analogue commands	**1**
• Max quantity of selector commands (optional)	**4**

Transmitters type S, G and Z:

• Max quantity of ON/OFF commands	**20**
• Service commands	**1, (3) Start (Klaxon and Timed Stop, optional)**
• Max. quantity on analogue commands	**8**

* Data Feedback version

Transmitting unit WAVE type:

- Emission power of the R.F. system **10 mW ERP (Internal Antenna)**
- Emission class **25K0F1D**
- Oscillator type **Synthesizer**
- Supply tension **2.4 Vdc**
- Power demand **100 mA, 120mA***
- Supply power **0,3 W***
- Battery **Ni-MH 2,4V 1.5 A/h**
- Autonomy at 20 °C with charged battery – continuos operation **≅ 15 hours , 12 hours***
- Advice time “battery down” **≅15 min**
- LCD* Display **2 lines of 8 characters each (30x15mm)**
- Visualisation speed of the characters on the display **100 char/sec**

Transmitting units type S, G and Z:

- Emission power of the R.F. system **10 mW ERP (Internal antenna)**
- Emission class **25K0F1D**
- Type of oscillator **Synthesizer**
- Supply tension **6 Vdc**
- Current demand **90 mA, 110mA***
- Power demand **0,54 W, 0,66 W***
- Battery **Ni-MH 6V 1 A/h**
- Autonomy at 20 °C with charged battery – continuous operation **≅ 11 hours , 9 hours***
- Advise time “battery low” **≅15 min**
- LCD* Display **2 lines of 16 characters each (55x15 mm)**
- Visualisation speed for the characters on the display* **100 char/sec**

- Dimensions:

type WAVE S	**75x43x180 mm (L.P.H.)**
type WAVE L	**75x43x245 mm (L.P.H.)**
type S1, S2	**175x115x135 mm (L.P.H.)**
type G2, G3	**235x177x175 mm (L.P.H.)**
type Z2	**205x115x170 mm (L.P.H.)**
type Z6	**196x137x170 mm (L.P.H.)**

- Weight :

type WAVE S	**≅0,375 Kg**
type WAVE L	**≅0,465 kg**
type S1	**≅1,050 Kg**
type S2	**≅1,200 Kg**
type G2	**≅1,650 Kg**
type G3	**≅1,800 Kg**
type Z2	**≅ 1,200 Kg**
type Z6	**≅ 1,350 Kg**

* Data Feedback version

Receiving unit:

• RF receiver type	**Superetherodine IF 83.16 MHz - 455KHz**
• Emission power of the R.F. system	**10 mW ERP (Internal antenna)**
• Emission class *	**25K0F1D**
• Oscillator type *	**Synthesizer**
• Supply tension	**24 Vac, 48 ÷ 55 Vac, 110 Vac, 230 Vac, 12 ÷ 28 Vdc**
• Power demand	**15 W Max**
• Max. quantity of command relays (NO)	**16**
• Max quantity of command relays (NC/NO)	**4**
• Max. quantity of DC command drivers	**20**
• Max. quantity of service relays (NO)	**3**
• Max. carrying capacity of AC receiver command relays:	**10A 130V - AC1**
• Max. carrying capacity of DC receiver command relays	**6A 28V (resistive load pure L=0)** **2A 28V (inductive load L =10 mH)**
• Max. carrying capacity of AC receiver start relays	**12A 130V - AC1**
• Max. carrying capacity of DC receiver start relays	**12A 28V - DC1**
• Max. carrying capacity of AC klaxon relays (relays C3)	**12A 130V - AC1**
• Max. carrying capacity of DC klaxon relays	**12A 28V - DC1**
• Max. carrying capacity of AC timed stop (C4 relays)	**12A 130V - AC1**
• Max. carrying capacity of DC timed stop	**12A 28V - DC1**
• Max carrying capacity of AC safety STOP relays	**6A 130V - AC1**
• Max carrying capacity of DC safety STOP relays	**6A 28V - DC1**
• Max. carrying capacity of AC receiver stop relays	**6A 130V - AC1**
• Max. carrying capacity of DC receiver stop relays	**6A 28V - DC1**
• PWM analogue output	**0 ÷ 1.4 A MAX**
• Analogue output with loop of current	**0 ÷ 20 mA o 4 ÷ 20 mA**
• Analogue output in tension	**25% Vcc, 50% Vcc, 75% Vcc** **0 ÷ (Vcc-3) adjustable, MAX 28V**
• Input ports*	**Serial / Parallel**
• Max quantity of digital inputs*	**8**
• Max. quantity of analogue inputs*	**4**
• Data exchange speed of the parallel port*	**50000 char/sec**
• Data exchange speed of the synchronous serial port*	**15000 char/sec**
• Data exchange speed fo the asynchronous serial port*	**4800/9600 bit/sec**
• Dimensions	**145 X 65 X 225 mm (L.P.H)**
• Max. weight	**1,7 Kg**

* Data feedback version

Battery charger CB5000 for WAVE Models:

• Supply tension	**11÷32Vdc. Optional 230Vac**
• Power demand	**4W while charging**
• Charging current	**550mA**
• Max. charging time	**3 hours**
• Charge type	**PVD**
• Housing protection degree	**IP30**
• Storage temperature with loaded battery	**0°C ÷ +35°C (+32°F ÷ +95 °F)**
• Storage temperature off and without battery	**-20°C ÷ +70°C (-4°F ÷ +158 °F)**
• Dimensions	**75X49X142 mm (L.P.H.)**
• Weight	**250g**
• Weight with 230Vac transformer (optional)	**490g**

Battery charger CB6000 for S, G and Z models:

• Supply tension	**11÷32Vdc. Optional 230Vac**
• Power demand	**3W (while charging)**
• Charging current	**450mA**
• Max. charging time	**3 ore**
• Charge type	**PVD**
• Housing protection degree	**IP30**
• Operation temperature with loaded battery	**0°C ÷ +35°C (+32° F ÷ +95° F)**
• Storage temperature off and without battery	**-20°C ÷ +70°C (-4°F ÷ +158 °F)**
• Dimensions	**137x94x260 mm (L.P.H.)**
• Weight	**250g**
• Weight with transformer 230Vac (optional)	**620g**

8. INSTRUCTIONS FOR FREQUENCY CHANGE

The frequency change can be carried out for all models using two commands belonging to group A, (A1 - A8 for the joystick- for the tens, A2 for the units) and the button START ⏻ (see enclosures A and B). There are two different modalities at disposal: through the movement of the frequency channel in use to the second subsequent one (modality “two steps”) , or through the selection of a precise working channel (modality “any step”). If the selected channel should not be available, it is necessary to repeat the frequency change procedure till to find a channel free from any interference.

Frequency change - Modality “two steps”.

- ✓ Position the transmitting unit as close a possible to the receiver. Power up the receiver and turn the transmitter’s key clockwise (ON position).
- ✓ Activate the commands A1 and A2 simultaneously (A8 for the joystick) and A2 (see enclosure A for the identification), press the START ⏻. The ignition light placed on the transmitting unit should blink 4 times consecutively followed by a pause.
- ✓ Release the two commands and the START ⏻.
- ✓ Push the START ⏻ and check if the led placed on the transmitter blinks at regular intervals. Wait more or less 20 seconds, till the green light stops blinking and goes off. The system can now operate on the new frequency channel.
- ✓ By pressing again the START ⏻ it is possible to carry out the commands. If not, this means that a mistake has been made during the execution of the procedure. Switch off the system and repeat the operation from the beginning.

Frequency change - modality “any step”.

- ✓ Place the transmitter as close as possible to the receiving unit. Power up the receiver and turn the transmitter key clockwise (ON position).
- ✓ Actuate the commands A1 (A8 for the joystick) and A2 (see enclosure A for the identification) simultaneously, press the START ⏻. The ignition light on the transmitting unit should start blinking 4 times consecutively followed by a pause.
- ✓ Release the two commands and the START ⏻.
- ✓ Select one of the 69 available channels, by using A1 (A8 for the joystick) for the tens and A2 for the units. Example: for the push button, the channel 36 is selected by activating 3 times the command A1 (tens) and 6 times the command A2 (units).
- ✓ Press START ⏻ to confirm and check whether the green light place on the transmitter is blinking at regular intervals. Wait more or less 20 seconds, till the led stops blinking and goes off. Now the system is ready to operate on the new frequency channel.
- ✓ By pressing again the START ⏻, it is possible to carry out the commands. If not, this means that a mistake has been made during the execution of the procedure. Switch off the system and repeat the operation from the beginning.

The selection of the frequency channel is limited to number 3 for the tens (command A1 (A8 for the joystick)) and to number 9 for the units (command A2).By activating more than 3 times the tens, or more than 9 times the units, the counting begins again from 0.

To select “zero”, it is not necessary to activate the command. For ex. For channel 20, select 2 times the command A1 and press START ⏻ to confirm the operation.

NOTE: Selecting 3 for the tens, the units, even if of different value, will be always zero. By selecting channel 00, the frequency will change according to the “two steps” modality.

8.1 Available frequencies

Table of available frequencies			
CHANNEL	***FREQUENCY***	***CHANNEL***	***FREQUENCY***
01	*434.050 MHz*	***16***	*434.425 MHz*
02	*434.075 MHz*	***17***	*434.450 MHz*
03	*434.100 MHz*	***18***	*434.475 MHz*
04	*434.125 MHz*	***19***	*434.500 MHz*
05	*434.150 MHz*	***20***	*434.525 MHz*
06	*434.175 MHz*	***21***	*434.550 MHz*
07	*434.200 MHz*	***22***	*434.575 MHz*
08	*434.225 MHz*	***23***	*434.600 MHz*
09	*434.250 MHz*	***24***	*434.625 MHz*
10	*434.275 MHz*	***25***	*434.650 MHz*
11	*434.300 MHz*	***26***	*434.675 MHz*
12	*434.325 MHz*	***27***	*434.700 MHz*
13	*434.350 MHz*	***28***	*434.725 MHz*
14	*434.375 MHz*	***29***	*434.750 MHz*
15	*434.400 MHz*	***30***	*434.775 MHz*

Please find below all countries where the radio remote controls have been notified to the national competent authorities on the radio frequencies spectrum , according to the art. 6.4 of the 1999/5/CE directive.

No	**Country**
1	*Austria*
2	*Belgium*
3	*Denmark*
4	*Finland*
5	*France*
6	*Germany*
7	*Greece*
8	*England*
9	*Ireland*
10	*Italy*
11	*Luxembourg*
12	*Liechtenstein*
13	*Holland*
14	*Portugal*
15	*Spain*
16	*Sweden*
17	*Norway*
18	*Switzerland*
19	*Hungary*

The product can be sold in all countries belonging to the European community, acting in accordance to the ERC REC 70-03 norms. Each single Country can provide then for special restrictions or licenses of use, determined by the national competent authorities on the management of the telecommunications spectrum. For this reason, before using the radio remote control, it is necessary to get more acquainted with the current laws concerning this matter.

9. INSTRUCTIONS FOR PREVENTIVE MAINTENANCE

Some suggestions for a correct maintenance of your radio remote control.

- Do not expose to heat sources.
- Avoid exposure to sun for long periods.
- Do not wash with high pressure jets or immerse appliances into water.
- Avoid contact with oil and solvents.
- If the appliances are open, and make sure that the gaskets are tight.

Submit the radio remote control to regular cleaning and check operations to keep it efficient and safe.

Before starting the maintenance operations, switch off the receiver and the machine and remove the battery from the transmitter.

Use a brush and a wet cloth to carry out cleaning operations. Do not use alcohol or solvents, as they might damage components and radio remote control housing.

9.1 Periodical maintenance to be carried out by the operator

Clean periodically all external parts of the receiver and the transmitter. Material settlement may stop push buttons movement.

Pay particular attention to the emergency button, clean it carefully and check whether it moves without any difficulty.

Remove any oxidation form the battery contacts.

Check the integrity of the radio remote control housing and components. They may not have any creeks or even evident breaking.

All rubber parts, keys and gaskets must be free form tearing.

If you find any damaged components, replace them immediately to prevent humidity penetration and impurities from jeopardising safety and the perfect radio remote control operation.

9.2 Maintenance and internal controls

After one year of operation, carry out a careful internal maintenance of the radio remote control units. Said checks shall be carried out by specialised personnel.

Before opening the appliances, switch off the receiver and the machine and remove the transmitter battery. The operations described below should be carried out in a place free from dust and humidity.

Open the transmitter and receiver housing and check:

- The tightness of the gaskets.
- The cable connectors tightening.
- The screws tightening of the connection clamps and the connectors clutch.
- The tightening of the electronic cards.
- The tightening of the screws of the connection clamps and the integrity of the battery contacts.

Although well tight, dust and humidity can enter the radio apparatus . In this regard, we reccomend to remove carefully any foreign particles.

Reassemble the transmitter, making sure that it is well closed to avoid humidity infiltration.

When appliances are on, do not touch the parts under voltage of the receiver and carry out the following test:

- Check the correct operation of all commands
- Check the correct intervention of the emergency stop circuit. Press the emergency stop button while working; The machine main contactor circuit will be interrupted stopping all commands.

All faulty parts shall be replaced through original spare parts so that the system properties are not altered. See list of spare parts par. 10.1, 10.2

In the end, close the receiver and make sure that the gasket has perfect tightness.

10. INSTRUCTIONS TO BE COMPLIED WITH IN CASE OF INCONVENIENCES

The present chapter explains some problems which may occur during the radio remote control use and tries to give, for each problem, a possible solution.

Firstly, make sure if the failure is given by the radio remote control and replace it through a traditional cable control to check whether the machine operation is correct.

All repairs shall be carried out in compliance with the manufacturer's instructions. Any faulty parts shall be replaced through original spare parts so that the system properties are not altered. (see the list of the spare parts par. 10.1, 10.2 e 10.3).

Before carrying out any internal intervention, switch off receiver and machine and remove the battery from the transmitter.

We suggest to carry out a general check according to the following instructions.

The transmitter does not come on

Switch the device on by turning the selector key clockwise and activating the start control START ⏻. The green LED set on the transmitter should light up. If this is not the case, replace the battery in use with a charged one and check the presence of oxidation on the contacts. No commands (including the emergency button) have to be activated.

If after pressing the START ⏻, the green Led begins blinking very fast, this shows a failure in the emergency circuit. If after this operation the led begins giving a series of 8 short blinks (zero code), the circuit is working correctly, while on the contrary, the led will produce a failure code. In this case we suggest, for safety reasons, to avoid to start again the system, and to apply to a authorised assistance centre to solve the problem.

The receiver does not come on

Power Supply LED is off:

- Check the fuse F10 placed inside the receiver.
- Check the connection between the machine and the radio remote control.
- Check if the machine feeds correctly the receiver;

The receiver comes on but does not activate the machine main contactor

Check the F12 fuse status.

The system enters often into passive emergency status

Such a condition may be caused by other transmitters positioned nearby, transmitting on the same frequency. This hypothesis can be verified by simply switching off the transmitter and checking if the RF-busy LED on the receiver remains lit.

If the device is subject to interference during operation, the Data Error LED may switch off every time the system finds an error (errors may last more than 0.5 sec., sending the system into the passive emergency state).

The only way to avoid such problems is to change the frequency of the transmission channel. See paragraph 8 for instructions.

Other troubles may require the intervention of a technical assistance centre, authorised by the manufacturer.

10.1 List of transmitter spare parts

Description	*Article*
Reed contact key	AS038
Key for rotary selector	AS015
Shoulder belt	AS013
CB5000 230 Vac battery charger with Italian plug	CR010
CB5000 230 Vac battery charger with Shuko plug	CR012
CB5000 11 ÷ 32 Vdc battery charger	CR011
2.4V 1.5 A/h Ni-MH battery	AS037
CB6000 230 Vac battery charger with Italian plug	CR008
CB6000 230 Vac battery charger with Shuko plug	CR009
CB6000 11 ÷ 32 Vdc battery charger	CR007
6V 1 A/h Ni-MH battery	AS034

10.2 AC receiver spare parts

Description	*Article*
F10 fuse 5x20 T 1,25A delayed	*FS002*
F11 fuse 5x20 T 5A	*FS005*
F12 fuse 5x20 T 5A	*FS005*
F13 24÷55V fuse 5x20 T 1,25A delayed	*FS002*
F13 110÷230V fuse 5x20 T 0,63A	*FS001*

10.3 DC receiver spare parts

Description	*Article*
F10 fuse 5x20 T 1,25A delayed	*FS002*
F11 fuse 5x20 T 5A	*FS005*
F12 fuse 5x20 T 5A	*FS005*

10.4 Technical assistance

In all cases of a real radio remote control failure, which is not possible to detect on a superficial check, like the checks suggested in the present handbook conceived for non-specialised personnel, apply exclusively to the assistance service centre authorised by the manufacturer.

Get in contact with the nearest assistance centre or the reseller where you bought the radio remote control and tell him the following data:

- Radio remote control model.
- Serial Number.
- Detected problem.
- Purchase date.

Remember that the present handbook and the warranty certificate filled in all parts.

11. SCRAPPING

When the radio remote control cannot be used any longer, remove batteries and hand it over to the area disposal centre.

It is absolutely forbidden to throw batteries into the city wastes containers, as they are strongly polluting. Therefore, if necessary, throw them into the special containers.

12. COUPLING TELEGRAM DESCRIPTION

The constant length telegram is composed by 127 bits, 16 of which are assigned to the coupling address between transmitter and receiver, 83 of which are used for the command code, while the remaining 28bits implement the protection algorithm, assuring a Hamming distance of 9, with a probability of non-detection error of $7.34 \times 10^{-12,}$ both for the address and the command code.

The 16 address bits are used to couple the transmitting unit to the receiver through a single code, which is adjusted in the coupling electronic card and assigned exclusively to each radio remote control.

13. DECLARATION OF CONFORMITY

CE

Industrial radio remote control IMET model M550

Serial no. _____ Construction year **2004**

Is suitable

for installation on machines or other apparatus in conformity with the “Machine Directive 98/37 CE”

Is in conformity with the following standards / or technical specifications

- EN 330 220-3 (2000) (Standard SRD)
- EN 301 489-1 (2001) (Standard EMC)
- EN 301 489-3 (2002) (Standard EMC)
- EN 61000-6-2 (2001) (Standard EMC)
- EN 61000-6-4 (2001) (Standard EMC)
- UNI EN 954-1 (10-1998) (Parts of the command system dealing with safety)
- EN 60204-32, 1998-10 (Machinery safety)
  Electric equipment of the machines – Part 32 : Requirements for hosting equipment
- EN 60950 (2000) (Safety in Information technology)

Which assign to the protection requirements stated by the CEE Directives

- 1999/5/CE acknowledged by the LEGISLATIVE DECREE 9th May 2001, No 269 (Directive R&TTE)
- 89/336/CEE, article 4, 10.1 and 10.2. Enclosures I and III (Directive EMC)
- 73/23/CEE, article 2, Enclosures I, III Part B and IV and following variations(Directive LV)

Sacile, 27th January 2004

IMET S.r.l.

The President Evio Cadorin